National Institute of Environmental Health Sciences

Comparisons of urban and rural heat stress conditions in a hot-humid tropical city

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Year: 2010
Journal: Global Health Action. 3

Abstract:

Background: In recent years the developing world, much of which is located in the tropical countries, has seen dramatic growth of its urban population associated with serious degradation of environmental quality. Climate change is producing major impacts including increasing temperatures in these countries that are considered to be most vulnerable to the impact of climate change due to inadequate public health infrastructure and low income status. However, relevant information and data for informed decision making on human health and comfort are lacking in these countries. Objective: The aim of this paper is to study and compare heat stress conditions in an urban (city centre) and rural (airport) environments in Akure, a medium-sized tropical city in south-western Nigeria during the dry harmattan season (January-March) of 2009. Materials and methods: We analysed heat stress conditions in terms of the mean hourly values of the thermohygrometric index (THI), defined by simultaneous in situ air temperature and relative humidity measurements at both sites. Results: The urban heat island (UHI) exists in Akure as the city centre is warmer than the rural airport throughout the day. However, the maximum UHI intensity occurs at night between 1900 and 2200 hours local time. Hot conditions were predominant at both sites, comfortable conditions were only experienced in the morning and evenings of January at both sites, but the rural area has more pleasant morning and evenings and less of very hot and torrid conditions. January has the lowest frequency of hot and torrid conditions at both sites, while March and February has the highest at the city centre and the airport, respectively. The higher frequencies of high temperatures in the city centre suggest a significant heat stress and health risk in this hot humid environment of Akure. Conclusions: More research is needed to achieve better understanding of the seasonal variation of indoor and outdoor heat stress and factors interacting with it in order to improve the health, safety, and productivity of Akure city dwellers.

Source: http://dx.doi.org/10.3402/gha.v3i0.5614

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Meteorological Factors, Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

Rural, Tropical, Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Nigeria

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Injury

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Low Socioeconomic Status

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content